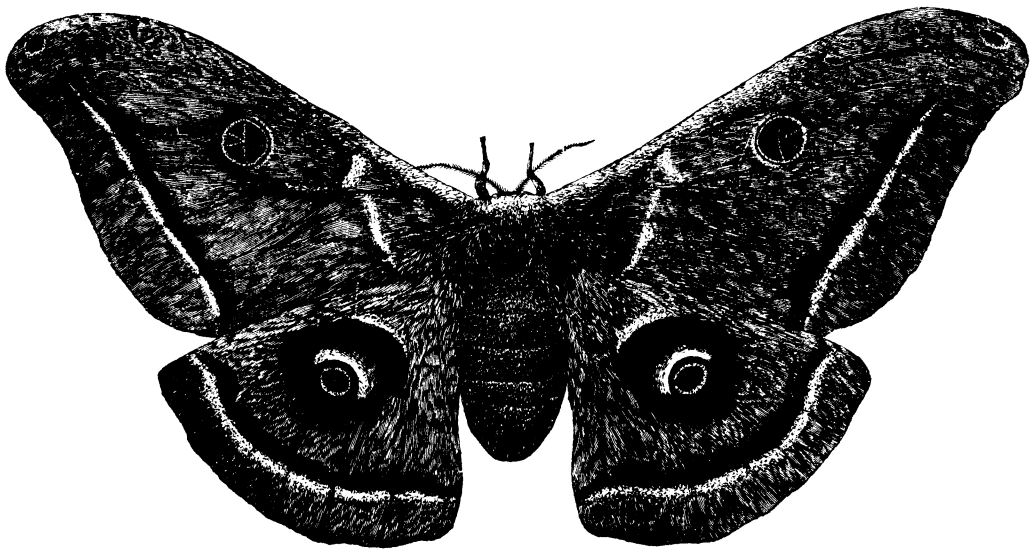
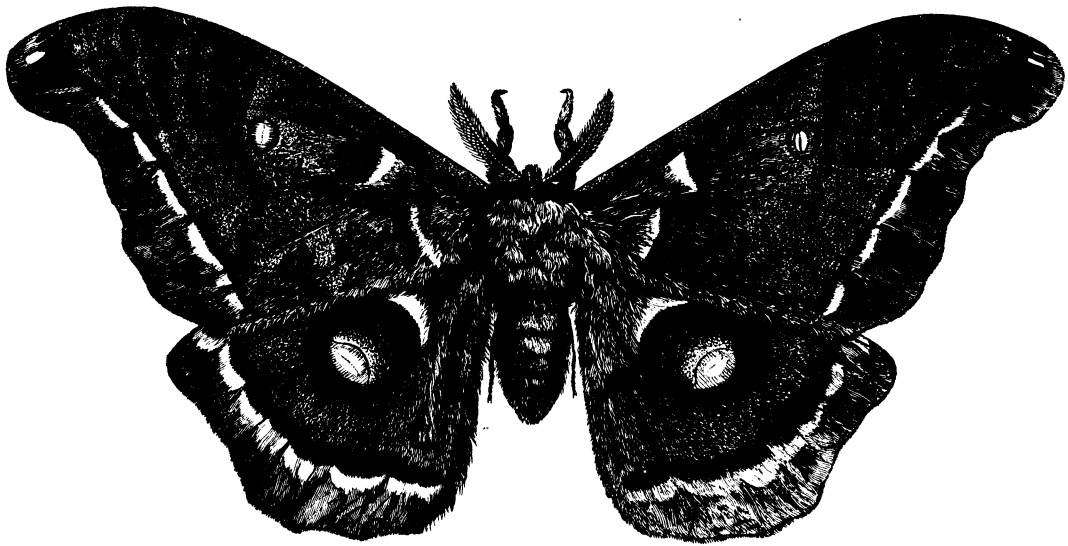


FEMALE OF THE AMERICAN SILK WORM.

TELEA POLYPHEMUS.



MALE OF THE AMERICAN SILK WORM.

TELEA POLYPHEMUS. [After HARRIS.]

THE AMERICAN SILK WORM.

BY L. TROUVELOT.

(Concluded from p. 95.)

Rearing of the larva in the open air. There are different ways of raising the wild silk worms. I have for two years cultivated them in the open air. I had about five acres of woodland enclosed by a fence eight feet high; a net was stretched over the bushes, which were of six or eight years' growth. This net, supported upon posts, was intended to protect the worms from the depredations of the birds. The eggs were put upon the bushes in the little hatching-box, so that after this, there seemed but very little to do. But it was not so: over so large a space, it was impossible to keep the net in good order, and the birds managed to get under it; the small ones could go through the meshes, and the larger ones through some holes in the old net, so I was obliged to chase them all the day long, as when pursuing them on one side they would fly to the other and quietly feed, until I again reappeared. Thus, besides the insect enemies enumerated above, many of the caterpillars fell a prey to the birds.

Rearing them under a shade. This year I made a shade open on all sides, protected by a roof to keep out the hot rays of the sun, and boards were arranged so that they could be raised up from the roof to give more light when the sun was behind the clouds, and also at morning, evening, and at night. This shade had a very fine net around it, so that it was impossible for the birds to get through the meshes. In this way an oak branch can be kept fresh for four or five days; a branch is placed in every two holes, so as to leave a vacant one between any two branches. When the foliage of one branch is nearly eaten up, a fresh one is put into the vacant hole, and small

twigs, going from the old branch to the fresh one, are placed so that the worms can cross upon it without descending upon the table. When the worms are attached for the purpose of moulting, they should not be disturbed or taken away from the place where they are, as they could not so easily change their skin. Three times a day the excrements should be swept from the table. In warm days some water should be sprinkled with a watering-pot upon the leaves, as the worms are fond of drinking water. The worms should be handled as little as possible, and only when it is absolutely necessary. The space that remains open between the branch and the table should be filled with paper or hay, so that the larvæ may not crawl under the table, as they would be drowned in the water contained in the bottle.

For cultivating Silk Worms upon a large scale, it would be very well to select a place with a brook running through it, as the water could be made to flow under the table, in reservoirs, where the branches could always dip in fresh water; as the water put in the bottles is soon corrupted, and the branches absorb much of it, they need to be filled up several times a day.

When a cocoon is well begun, the best way will be to separate from the branch the twig and leaves between which it is built, so that other worms will not disturb the larvæ working inside; this cocoon should be placed upon lines stretched for that purpose in a special room, where the sun cannot reach it. Ten or twelve days after, they will be completed, and may be placed in baskets, and kept as I have indicated above.

Some experiments made on our Silk Worm show how hardy it is, being the easiest of all the silk worms to take care of. Chrysalids were put into a tin box,

which was placed in another box containing ice and salt; the temperature soon descended to four degrees below zero. They were allowed to remain in this refrigerator for half an hour. When taken out, the chrysalids were as hard as a piece of ice; they were immediately put into a cold room. Several days after this, the temperature of the room being above the freezing point, the chrysalids gave signs of life by moving the abdomen. Some years ago, wanting to keep a cocoon in my collection, I thrust a pin through it, and it passed through the body of a living chrysalis inside of it; this was done in the month of October. Nine months after, in June of the following year, I was astonished to find a great commotion in one of the boxes of my collection; all the specimens were broken, and I found the cocoon which had been pinned in the box, detached and open at one end, and the antennæ, head and legs of the moth projecting out of it; the insect was still living and could not come out, as the pin passing through it had also transfixed the cocoon. Through this insect had been thrust, for nine months, a pin covered with verdigris, and yet had not been killed by it! Naturalists state that it is very important, when transporting cocoons in a box, to pierce the box with holes so that the air may penetrate it, as if air was needed for a chrysalis inside the cocoon. Having observed how close and air-tight the cocoon of the Polyphemus seems to be, I could not conceive that air was needed for it to breathe. Desirous of ascertaining whether my idea was correct, I took three cocoons, and at two different times I covered them carefully with a thick coating of starch, allowing the first coating to dry before putting on the second one. After this the cocoons were covered at three different times with a heavy coating of shellac varnish; thus the cocoons

were made perfectly air-tight. They were kept in a cold dry room all winter. In July the moths came out perfectly healthy, the fluid they discharge through the mouth having perfectly dissolved the starch and varnish. So these insects had been nine months with no air, except the very small volume enclosed in the cocoon, and they had accomplished their transformation just as well as if the air had been allowed to come into the cocoon.

It seems to me that when once enclosed in the cocoon, the pupa is in a transitory state. The process of assimilation, at least during the cold days, seems to have ceased. In the stomach of chrysalids can be found an albuminous, greenish substance; probably it is a food which can be assimilated, or at least transformed into some of the liquids which are discharged by the perfect insect when coming out of the cocoon. If there is any elaboration of the food in the chrysalis, the process must be very slow, and surely no air is needed to accomplish it, nor any food, except what little food is in the stomach. The most striking phenomena manifested by life is the assimilation and elimination of food; but to assimilate, the animal must take food, either in the solid or gaseous form. We know that the chrysalis cannot eat; breathing is very problematical. Before changing into a chrysalis, the worm evacuates all the contents of its stomach; so, in my opinion, the chrysalis does not breathe, or if at all, it is so very slight as to be insignificant.

There is not much possibility of being able to obtain two broods of the Silk Worm in the same year in this latitude. The earliest date at which I have obtained cocoons was the first of August, twenty-two days after the moth hatched from the cocoon. On the fifth of September I had young larvæ, but the heat being less in this

month than in July and August, the larvæ did not grow so rapidly, and the moulting did not take place so regularly. The first moulting took place on the fourteenth day, the second the twenty-third day, the third the thirty-sixth day; on the first of November, or fifty-six days after their birth, they had not accomplished the fourth moulting. I could not continue the experiment, as I left for Europe the second of November; but they had frozen several times, and the leaves were very hard, in fact I do not believe that the second brood would have come to maturity. I do not see that it would be of any advantage to obtain two broods, as the moths do not all come out of the cocoon at the same time, but sometimes there are two months between the first and the last; so the process of rearing can go on permanently all summer, which is equal to having two broods.

Cocoons can be retarded in hatching out by being put in a very cold room—an ice-house, for instance; in this way they can be made to hatch another year, or nearly twenty-one months after they have been in the cocoon. In fact, the time of their appearance can be put back for an indefinite period, as life is nearly suspended. Reaumur states, that, at the time he was writing, he had in his cellar pupæ which had been there for five years, which were still living. I have myself kept pupæ of sphingidæ, or hawkmoths, for three years in my cellar. At the time I went to Europe, they were still living, but on my return I found that the rats had eaten them.